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# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
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## DIVISION OF OIL GAS & MINING FIELD VISIT FORM TECHNICAL

**Date :** 15 October, 1998

**Time:** 9:00 a.m. to 3:00 p.m.

**Mines:** CO-OP Bear Canyon Mine.

**File Number:** ACT/015/025 #2

**DOGM Staff:** Jim SMITH

**Other Attendees:** Charles REYNOLDS, CO-OP

### Purposes:

1. To examine the 3-dimensional orientation, continuity, and interconnectivity of joints (fractures) associated with Birch Spring.
2. To examine the relationship of the Blind Canyon fault to Birch Spring and associated joints.
3. To examine possible relationships between Birch Spring and the geology and geography of the terrain immediately surrounding the spring.

### Observations:

1. Birch Spring is not a single source but several sources flowing from fractures and a fault, mainly on the west side of the box canyon containing the springs.
2. The Blind Canyon fault is evident on aerial photos and on the ground: the fault in the box canyon is not the Blind Canyon fault.
3. Joints and faults appear to strike consistently N-S  $\pm 5^\circ$ , but there are a few joints that strike approximately N 20°W.
4. Joints and faults appear to be basically vertical and planar, but on large vertical exposures the joints are often seen to be gently curved or even sinuous.
5. Observed faults are characterized by zones, several feet wide, of large, blocky rubble or breccia. Fracturing in the zone is dominantly vertical to near vertical, for example the fault at the west side at the head of the box canyon containing Birch Spring.

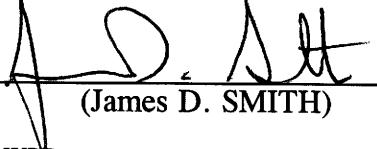
6. Faults and large joints can be followed vertically from the Storrs Sandstone, up through the overlying shales, and into the Spring Canyon Sandstone; however,
7. Some large adjacent joints, such as those exposed above sources #1 and #2 at Birch Spring, are connected by sets of steeply dipping fractures, similar to the fault zones only not vertically extensive.
8. Large joints can be followed or projected for hundreds of feet along strike.
9. Joints appear to be gradually converging upslope (north) and may actually converge northward or upwards or both.
10. Most of the area is jointed, the distance between joints ranging from 2 or 3 feet to 35 feet; one section between the Blind Canyon fault and Birch Spring is not visibly jointed across an exposure approximately 50 feet wide.
11. Vegetation is growing on the three reclaimed breakout/subsidence areas in Section 28, but the easternmost has continued to settle or subside.

### **Conclusions:**

1. Birch Spring does not issue from the Blind Canyon fault, but the several water sources that constitute Birch Spring issue from large joints and a fault zone.
2. Joints and faults have good continuity vertically and along strike, which is roughly N-S. Ground-water flow from north to south would be facilitated along these fractures.
3. There are thick unfractured sections, and lateral interconnectivity between joints and faults is not as well developed. East-west flow would be impeded relative to north-south flow.
4. Although the terrain is steep, the extensive jointing could allow local recharge from precipitation and snowmelt.
5. Additional reclamation work is needed at the subsidence area in Section 28.

### **Recommendations:**

No further action at this time. Charles REYNOLDS is preparing a response to the complaint from NEWUA, as outlined in Tech-005, that will include his interpretation of the geology and geography of the area around Birch Spring. Further action will depend on the acceptability of CO-OP's response and on the time and effort UDOGM can allocate to the problem. Further actions could include detailed geologic interpretation from low-altitude aerial photos and 3-dimensional mapping and modeling using EarthVision.

**Signature:**  , Reclamation Specialist, October 20, 1998  
(James D. SMITH)

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